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Paper augmented digital documents

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[Proceedings of the 16th annual ACM symposium on User interface software and technology](#)
[table of contents](#)
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[SIGCHI](#): ACM Special Interest Group on Computer-Human Interaction
: Nokia
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↑ ABSTRACT

Paper Augmented Digital Documents (PADDs) are digital documents that can be manipulated either on a computer screen or on paper. PADDs, and the infrastructure supporting them, can be seen as a bridge between the digital and the paper worlds. As digital documents, PADDs are easy to edit, distribute and archive; as paper documents, PADDs are easy to navigate, annotate and well accepted in social settings. The chimeric nature of PADDs make them well suited for many tasks such as proofreading, editing, and annotation of large format document like blueprints. We are presenting an architecture which supports the seamless manipulation of PADDs using today's technologies and reports on the lessons we learned while implementing the first PADD system.

↑ REFERENCES

Note: OCR errors may be found in this Reference List extracted from the full text article. ACM has opted to expose the complete List rather than only correct and linked references.

- 1 1. Saving Trees. The Economist, November 9th 2002, (http://www.economist.com/displaystory.cfm?story_id=1431718).
- 2 2. Adobe System Incorporated, *Acrobat Core API Reference*. (<http://partners.adobe.com>).
- 3 3. Adobe System Incorporated, *PDF reference: Adobe portable document format version 1.4*. 3 ed. 2001: Addison-Wesley.
- 4 4. Anoto, *Development Guide for Service Enabled by Anoto Functionality*. 2002, Anoto (<http://www.anoto.com>).
- 5 Toshifumi Arai , Dietmar Aust , Scott E. Hudson, PaperLink: a technique for hyperlinking from real paper to electronic content, Proceedings of the SIGCHI conference on Human factors in computing systems, p.327-334, March 22-27, 1997, Atlanta, Georgia, United States
- 6 Daniel Avrahami , Scott E. Hudson , Thomas P. Moran , Brian D. Williams, Guided gesture support in the paper PDA, Proceedings of the 14th annual ACM symposium on User interface software and technology, November 11-14, 2001, Orlando, Florida
- 7 Marc Dymetman , Max Copperman, Intelligent Paper, Proceedings of the 7th International Conference on Electronic Publishing, Held Jointly with the 4th International Conference on Raster Imaging and Digital Typography: Electronic Publishing, Artistic Imaging, and Digital Typography, p.392-406, March 30-April 03, 1998
- 8 Gene Golovchinsky , Laurent Denoue, Moving markup: repositioning freeform annotations, Proceedings of the 15th annual ACM symposium on User interface software and technology, October 27-30, 2002, Paris, France
- 9 Beverly L. Harrison , Kenneth P. Fishkin , Anuj Gujar , Carlos Mochon , Roy Want, Squeeze me, hold me, tilt me! An exploration of manipulative user interfaces, Proceedings of the SIGCHI conference on Human factors in computing systems, p.17-24, April 18-23, 1998, Los Angeles, California, United States
- 10 10. Hecht, D.L. Embedded Data Glyph Technology for Hardcopy Digital Documents. Proceedings of SPIE Color Hard Copy and Graphic Arts III, pp. 341 - 352.
- 11 Jeremy M. Heiner , Scott E. Hudson , Kenichiro Tanaka, Linking and messaging from real paper in the Paper PDA, Proceedings of the 12th annual ACM symposium on User interface software and technology, p.179-186, November 07-10, 1999, Asheville, North Carolina, United States
- 12 Philip Su , Robert Jarrett, Building Tablet PC Applications with Cdrom, Microsoft Press, Redmond, WA, 2002
- 13 Walter Johnson , Herbert Jellinek , Leigh Klotz, Jr. , Ramana Rao , Stuart K. Card, Bridging the paper and electronic worlds: the paper user interface, Proceedings of the SIGCHI conference on Human factors in computing systems, p.507-512, April 24-29, 1993, Amsterdam, The Netherlands
- 14 Hideki Koike , Yoichi Sato , Yoshinori Kobayashi , Hiroaki Tobita , Motoki Kobayashi, Interactive textbook and interactive Venn diagram: natural and intuitive interfaces on augmented desk system, Proceedings of the SIGCHI conference on Human factors in computing systems, p.121-128, April 01-06, 2000, The Hague, The Netherlands
- 15 15. Levine, S.R. and S.F. Ehrlich, The Freestyle System: A Design Perspective, in Human-Machine Interactive Systems, A. Klinger, Editor. 1991. pp. 3-21.

- 16 16. Logitech, *IO digital pen*. <http://www.logitech.com>,
- 17 W. Mackay , D. Pagani, Video mosaic: laying out time in a physical space, Proceedings of the second ACM international conference on Multimedia, p.165-172, October 15-20, 1994, San Francisco, California, United States
- 18 W. E. Mackay , D. S. Pagani , L. Faber , B. Inwood , P. Launiainen , L. Brenta , V. Pouzol, Ariel: augmenting paper engineering drawings, Conference companion on Human factors in computing systems, p.421-422, May 07-11, 1995, Denver, Colorado, United States
- 19 Wendy E. Mackay , Anne-Laure Fayard , Laurent Frobert , Lionel Médini, Reinventing the familiar: exploring an augmented reality design space for air traffic control, Proceedings of the SIGCHI conference on Human factors in computing systems, p.558-565, April 18-23, 1998, Los Angeles, California, United States
- 20 Wendy E. Mackay , Guillaume Pothier , Catherine Letondal , Kaare Bøegh , Hans Erik Sørensen, The missing link: augmenting biology laboratory notebooks, Proceedings of the 15th annual ACM symposium on User interface software and technology, October 27-30, 2002, Paris, France
- 21 Catherine C. Marshall, Annotation: from paper books to the digital library, Proceedings of the second ACM international conference on Digital libraries, p.131-140, July 23-26, 1997, Philadelphia, Pennsylvania, United States
- 22 22. Microsoft, *TabletPC*. (<http://www.tabletpc.com>).
- 23 Paul V. Mockapetris , Kevin J. Dunlap, Development of the Domain Name System, ACM SIGCOMM Computer Communication Review, v.25 n.1, p.112-122, Jan. 1995
- 24 Athicha Muthitacharoen , Benjie Chen , David Mazières, A low-bandwidth network file system, Proceedings of the eighteenth ACM symposium on Operating systems principles, October 21-24, 2001, Banff, Alberta, Canada
- 25 Shinji Nabeshima , Shinichirou Yamamoto , Kiyoshi Agusa , Toshio Taguchi, MEMO-PEN: a new input device, Conference companion on Human factors in computing systems, p.256-257, May 07-11, 1995, Denver, Colorado, United States
- 26 Mendel Rosenblum , John K. Ousterhout, The design and implementation of a log-structured file system, ACM Transactions on Computer Systems (TOCS), v.10 n.1, p.26-52, Feb. 1992
- 27 Bill N. Schilit , Gene Golovchinsky , Morgan N. Price, Beyond paper: supporting active reading with free form digital ink annotations, Proceedings of the SIGCHI conference on Human factors in computing systems, p.249-256, April 18-23, 1998, Los Angeles, California, United States
- 28 Abigail J. Sellen , Richard H.R. Harper, The Myth of the Paperless Office, MIT Press, Cambridge, MA, 2003
- 29 Lisa Stifelman , Barry Arons , Chris Schmandt, The audio notebook: paper and pen interaction with structured speech, Proceedings of the SIGCHI conference on Human factors in computing systems, p.182-189, March 2001, Seattle, Washington, United States
- 30 Pierre Wellner, Interacting with paper on the DigitalDesk, Communications of the ACM, v.36 n.7, p.87-96, July 1993
- 31 31. Yen, S.J., Capturing multimodal design activities in support of information retrieval and process analysis, PhD thesis, Stanford University. 2001

↑ INDEX TERMS

Primary Classification:

H. [Information Systems](#)

↳ H.3 [INFORMATION STORAGE AND RETRIEVAL](#)

↳ H.3.7 [Digital Libraries](#)

Additional Classification:

H. [Information Systems](#)

↳ H.5 [INFORMATION INTERFACES AND PRESENTATION \(I.7\)](#)

↳ H.5.2 [User Interfaces \(D.2.2, H.1.2, I.3.6\)](#)

↳ **Subjects:** [Theory and methods; Input devices and strategies \(e.g., mouse, touchscreen\)](#)

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1 [Human-computer interface development: concepts and systems for its management](#)

H. Rex Hartson, Deborah Hix

 March 1989 **ACM Computing Surveys (CSUR)**, Volume 21 Issue 1

 Full text available: [pdf\(7.97 MB\)](#)

 Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index t](#)

Human-computer interface management, from a computer science viewpoint, focuses on the proc quality human-computer interfaces, including their representation, design, implementation, execu and maintenance. This survey presents important concepts of interface management: dialogue inc structural modeling, representation, interactive tools, rapid prototyping, development methodolog structures. *Dialogue independence* is th ...

2 [Geographic Data Processing](#)

George Nagy, Sharad Wagle

 June 1979 **ACM Computing Surveys (CSUR)**, Volume 11 Issue 2

 Full text available: [pdf\(4.20 MB\)](#)

 Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

3 [Spoken dialogue technology: enabling the conversational user interface](#)

 March 2002 **ACM Computing Surveys (CSUR)**, Volume 34 Issue 1

 Full text available: [pdf\(987.69 KB\)](#)

 Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index t](#)

Spoken dialogue systems allow users to interact with computer-based applications such as databa systems by using natural spoken language. The origins of spoken dialogue systems can be traced Intelligence research in the 1950s concerned with developing conversational interfaces. However, last decade or so, with major advances in speech technology, that large-scale working systems ha and, in some cases, introduced into commerc ...

Keywords: Dialogue management, human computer interaction, language generation, language i speech recognition, speech synthesis


4 [Interactive Editing Systems: Part II](#)

Norman Meyrowitz, Andries van Dam

 September 1982 **ACM Computing Surveys (CSUR)**, Volume 14 Issue 3

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5 [Efficient algorithms for geometric optimization](#)

Pankaj K. Agarwal, Micha Sharir


December 1998 **ACM Computing Surveys (CSUR)**, Volume 30 Issue 4Full text available:  [pdf\(577.74 KB\)](#)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

We review the recent progress in the design of efficient algorithms for various problems in geometry. We present several techniques used to attack these problems, such as parametric searching, geometric searching, prune-and-search techniques for linear programming and related problems and their efficient solution. We then describe a wide range of applications of these and of numerous problems in geometric optimization ...

Keywords: clustering, collision detection, linear programming, matrix searching, parametric search problems, prune-and-search, randomized algorithms

6 [Cooperative visual manipulation of music notation](#)

P. Bellini, P. Nesi, M. B. Spinu


September 2002 **ACM Transactions on Computer-Human Interaction (TOCHI)**, Volume 9 Issue 3Full text available:  [pdf\(3.42 MB\)](#)Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

As computer technologies and their potential emerging applications spread out, new needs have been created for computer-based applications of music; cooperative music notation editing both in orchestras and in other contexts. This article is the only public document describing the details of cooperative work on music notation. MOODS (Music Object Oriented Distributed System). MOODS is a synchronous real-time cooperative work system for editing music scores. Its architecture includes mechanisms ...

Keywords: Collaboration of music notation editing, additional command list, collaborative system supported cooperative work, consistency control, cooperative music, distributed music, electronic version, selective undo, user interface management systems

7 [Technique for automatically correcting words in text](#)

Karen Kukich

December 1992 **ACM Computing Surveys (CSUR)**, Volume 24 Issue 4Full text available:  [pdf\(6.23 MB\)](#)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Research aimed at correcting words in text has focused on three progressively more difficult problems: (1) error detection; (2) isolated-word error correction; and (3) context-dependent word correction. In the first problem, efficient pattern-matching and n-gram analysis techniques have been developed for words that do not appear in a given word list. In response to the second problem, a variety of general algorithms for specific spelling correction ...

Keywords: n-gram analysis, Optical Character Recognition (OCR), context-dependent spelling correction, checking, natural-language-processing models, neural net classifiers, spell checking, spelling error patterns, statistical-language models, word recognition and correction

8 [Selected definitions](#)

W. Barkley Fritz


April 1963 **Communications of the ACM**, Volume 6 Issue 4Full text available:  [pdf\(1.10 MB\)](#)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#)

A selection of the definitions prepared by the ACM Standards Committee's Subcommittee on Program Terminology is presented for review by the ACM membership.

9 Behavioral Aspects of Text Editors

David W. Embley, George Nagy

January 1981 **ACM Computing Surveys (CSUR)**, Volume 13 Issue 1


Full text available:  pdf(3.44 MB)

Additional Information: [full citation](#), [references](#), [citations](#)

10 Status report of the graphic standards planning committee of ACM/SIGGRAPH: State-of-the software packages

Computer Graphics staff

September 1977 **ACM SIGGRAPH Computer Graphics**, Volume 11 Issue 3


Full text available:  pdf(9.03 MB)

Additional Information: [full citation](#), [references](#)

11 Virtual video editing in interactive multimedia applications

Wendy E. Mackay, Glorianna Davenport

July 1989 **Communications of the ACM**, Volume 32 Issue 7

Full text available:  pdf(2.33 MB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Drawing examples from four interrelated sets of multimedia tools and applications under development, the authors examine the role of digitized video in the areas of entertainment, learning, research, and education.

12 A structured APL approach to computer aided instruction

Wilbur R. LePage

September 1981 **ACM SIGAPL APL Quote Quad , Proceedings of the international conference on APL**, Volume 1 Issue 1

Full text available:  pdf(673.77 KB)


Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

The APL-based system for Computer Aided Instruction described in this paper is presented as a general system having interest in its own right, and also as an illustration of a "structured" approach to the relatively complex computing problem. The system meets the more or less mandatory requirements that the student user nor the teacher who creates the CAI instructional material should be required to know the features of the system. The ease with which the system can be modified to meet the needs of a particular user is a feature of the system.

13 Learning to use word processors: problems and prospects

Robert L. Mack, Clayton H. Lewis, John M. Carroll

July 1983 **ACM Transactions on Information Systems (TOIS)**, Volume 1 Issue 3


Full text available:  pdf(1.19 MB)

Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

14 DOCUMENTS: an interactive online solution to four documentation problems

T. R. Girill, Clement H. Lulc

May 1983 **Communications of the ACM**, Volume 26 Issue 5

Full text available:  pdf(1.14 MB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)


An adequate delivery system for user documentation addresses the problems of easy access, versatile administration, and good document quality. At the National Magnetic Fusion Energy Center, the DOCUMENT program helps solve these problems by providing a high level of service through strategies that can readily be exported to other contexts. Dividing machine-readable documents into keyword windows online, subject-oriented ...

Keywords: help packages, information retrieval, keywords, online catalogs, user assistance, user

15 A search algorithm and data structure for an efficient information system

Shou-chuan Yang

September 1969 **Proceedings of the 1969 conference on Computational linguistics**

Full text available:  pdf(1.54 MB)


Additional Information: [full citation](#), [abstract](#), [references](#)

This paper describes a system for information storage, retrieval, and updating, with special attention to a search algorithm and data structure demanded for maximum program efficiency. The program efficiency is warranted when a natural language or a symbolic language is involved in the searching process. The framework for an efficient information system. It can be implemented for text processing and document numerical data retrieval; and for handling of la ...

16 Document Formatting Systems: Survey, Concepts, and Issues

Richard Furuta, Jeffrey Scofield, Alan Shaw

September 1982 **ACM Computing Surveys (CSUR)**, Volume 14 Issue 3


Full text available:  pdf(5.36 MB)

Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

17 New Methods in Automatic Extracting

H. P. Edmundson

April 1969 **Journal of the ACM (JACM)**, Volume 16 Issue 2

Full text available:  pdf(1.16 MB)


Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

This paper describes new methods of automatically extracting documents for screening purposes, selection of sentences having the greatest potential for conveying to the reader the substance of the previous work has focused on one component of sentence significance, namely, the presence of high content words (key words), the methods described here also treat three additional components: phrase (cue words); title and heading words; and structure ...

18 The evolution of the Sperry Univac 1100 series: a history, analysis, and projection

B. R. Borgerson, M. L. Hanson, P. A. Hartley

January 1978 **Communications of the ACM**, Volume 21 Issue 1

Full text available:  pdf(1.89 MB)

Additional Information: [full citation](#), [abstract](#), [citations](#), [index terms](#)


The 1100 series systems are Sperry Univac's large-scale mainframe computer systems. Beginning in 1962, the 1100 series has progressed through a succession of eight compatible computer models. The latest system, the 1100/80, introduced in 1977. The 1100 series hardware architecture is based on a 36-bit complement structure which obtains one operand from storage and one from a high-speed register from high-speed registers. The 1100 Operating System ...

Keywords: 1100 computer series, computer architecture, data management systems, end user file control software, multiprocessing, multiprogramming, operating system, programming languages

19 Interactive Editing Systems: Part I

Norman Meyrowitz, Andries van Dam

September 1982 **ACM Computing Surveys (CSUR)**, Volume 14 Issue 3


Full text available:  pdf(3.08 MB)

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20 Invited papers—1: classification in information storage and retrieval

R. W. House, O. E. Taulbee

August 1965 **Proceedings of the 1965 20th national conference**

Full text available:  [pdf\(1.62 MB\)](#)

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WHEN I WAS ASKED to give a tutorial paper on information storage and retrieval, my first thought was a state-of-the-art survey of the field. But then it was evident that much of the paper would be a "state-of-the-art" survey since there have been several recent review papers^{1, 2, 3}. Classification is a much-used, sometimes abused, concept not only in information storage and retrieval but in many other endeavors.

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